Subject: Any drawbacks using openvz-enterprise kernel with <4GB RAM?
Posted by wfischer on Wed, 21 Jun 2006 13:07:11 GMT
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If we have multiple machines with identical hardware, but only different amount of memory (between 1 and 8 GB), are there problems or some big performance penalties when we use ovzkernel-enterprise kernel on all machines (also on the machines with less than 4 GB memory)?

I looked on the diff of the smp- and enterprise-config of openvz-kernel, and got this result:
[user@linux openvz-kernel-configs]$ diff kernel-2.6.8-022stab077-i686-smp.config.ovz kernel-2.6.8-022stab077-i686-enterprise.config.ovz
93,97c93,97
< # CONFIG_X86_4G is not set
< # CONFIG_X86_SWITCH_PAGETABLES is not set
< # CONFIG_X86_4G_VM_LAYOUT is not set
< # CONFIG_X86_UACCESS_INDIRECT is not set
< # CONFIG_X86_HIGH_ENTRY is not set

> CONFIG_X86_4G=y
> CONFIG_X86_SWITCH_PAGETABLES=y
> CONFIG_X86_4G_VM_LAYOUT=y
> CONFIG_X86_UACCESS_INDIRECT=y
> CONFIG_X86_HIGH_ENTRY=y
101c101
< CONFIG_NR_CPUS=8

> CONFIG_NR_CPUS=32
125,126c125,126
< CONFIG_HIGHMEM4G=y
< # CONFIG_HIGHMEM64G is not set

> # CONFIG_HIGHMEM4G is not set
> CONFIG_HIGHMEM64G=y
127a128
> CONFIG_X86_PAE=y

I'm not sure if some of the options (e.g. CONFIG_X86_4G=y) have a negative influence on performance when the machine has not more than 4 GB memory.

I already looked at http://wiki.openvz.org/Different_kernel_flavors_%28UP%2C_SMP%2C_ENTERPRISE%2C_ENTNOSPLIT%29 but I would be interested in more detail what side-effects the the config parameters have that are different across the 4 configurations. I also googled for the config parameters (like CONFIG_X86_4G), but did not find good explanations. Does anybody know of a good resource on these kind of information?

best wishes from sunny Austria,
Werner

Subject: Re: Any drawbacks using openvz-enterprise kernel with <4GB RAM?
Posted by wfischer on Wed, 21 Jun 2006 19:04:16 GMT
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I asked some technical guy in parallel via email and got this answer, which is very interesting for me - and so it is rather clear that is not very good to use Enterprise Kernel for a machine with e.g. 1 GB RAM:
"Due to PAE (HIGHMEM64) and 4GB split, performance penalty can be as large as 10-30%. Thus if for the machines with less than 4GB it is best to use SMP or UP(in case of 1 CPU)."

greetings,
Werner

Subject: Re: Any drawbacks using openvz-enterprise kernel with <4GB RAM?
Posted by dev on Thu, 22 Jun 2006 07:13:38 GMT
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One note which describes why enterprise kernel is required though it has such performance overhead:

i686 architecture is 32 bit, which limits virtual address space to 4GB of RAM. This address space is splitted between user applications and kernel. In std kernels it is splitted as 3GB(user):1GB(kernel). So Linux kernel directly can access _only_ 1GB of RAM. This 1Gb is called "normal zone" and is used for kernel structures and private memory. Effectively, normal zone has usually about 700-800Mb of usable RAM, which is suitable for running ~5000-8000 of tasks and ~20-60 VPSs. If this zone is exhausted kernel starts working very slow as it takes time to find any free memory.

enterprise kernel increases size of normal zone up to 3.6Gb. This allows to run ~4 times more tasks and VPSs on machines with >=8GB RAM. It is a tradeoff between performance and density.